REMARKS

Applicants thank Examiner Egan for his courteous and congenial telephone interview with Applicants' representative on November 12, 2004 with respect to the Period for Reply to the Advisory Action. Applicants filed a response to the Final Rejection mailed July 29, 2004 within two months. Accordingly, box "b" and not box "a" should have been checked. Applicants respectfully request a correction to this error.

Claims 27-30 and 32-35 are pending in the present application.

Support for new claim 35 is at page 6, line 30 to page 9, line 19.

Claims 1-26 and 31 were canceled.

Claims 27-30 and 32-34 are rejected.

Claims 27-29 and 32-34 are rejected under 35 U.S.C. §103(a) as allegedly unpatentable over U.S. 5,783,255 to Suda et al. Applicants respectfully traverse this rejection.

In the Final Rejection at paragraph 2, page 3, the U.S. Patent Office (Office) states that Suda et al. teach an example of a silicon carbide (SiC) shell with a diameter of 150 mm (perimeter of about 18.5 inches), and that Suda et al. fail to teach that the external perimeter of the article can be increased to exceed 65 inches and that the aspect ratio can exceed 200. The Office further argues that a change in size of the article of Suda et al. to meet Applicants' claimed invention would be a change in size within the level of ordinary skill in the art; and a change in size of an article is generally regarded as such.

However, the Office is in error. A mere change in size of a SiC article would not have been obvious to a person of skill in the art. Changing the size of a ceramic article, such as an article of SiC as claimed in the present invention, does not involve the level of ordinary skill in the art. Changing the size of the article, i.e., making it larger, may readily lead to undesirable cracks or defects in the article. Support for this argument is found in the paper entitled "Applications of Chemical Vapor Deposited β-SiC" submitted in an Information Disclosure Statement in response to the Final Rejection. This paper points out that SiC is a brittle ceramic material which is susceptible to flaw induced fracture. The strength of the article depends upon the size of the flaw in the material, which in turn depends upon the volume of the material used. Accordingly, the larger the size of the article, the higher the probability of finding a flaw of larger size. Thus, the larger the article is, the larger the flaw is expected to be, and the weaker the

article. Further, the paper points out that a large article of, for example, 1 meter in diameter has a strength $\sigma_1 = 31$ MPa, which is quite small. Such an article must be carefully handled to prevent it from damage during furnace cool-down.

The second paper entitled "ASM Handbook, volume 8, Mechanical Testing and Evaluation", also submitted in the Information Disclosure Statement, points out that a ceramic having a Weibull modulus *m* (convenient means of reporting strength data) of ≥ 30 has very consistent strengths and could be practically considered to have a deterministic value of strength over a wide range of several orders of magnitude volume (see last page of paper, first column). However, as disclosed in the first paper, SiC generally has a Weibull modulus $m = 11.45$, which is well below 30. Accordingly, the strength of SiC is not readily determinable over several orders of magnitude of volume. Further, the second paper also points out (second column) that strength values by themselves are only half the picture. The types of defects are equally important because each flaw type has it own Weibull distribution, and because multiple flaw populations are common in ceramics. Therefore, it is essential that the defects be as clearly associated with the strength values as possible. Accordingly, size change in ceramics, such as SiC, is not generally recognized as being within the level or ordinary skill in the art.

Although Suda et al. allege that their CVD method enables the formation of a crack free SiC article (col. 4, lines 15-23), the articles disclosed in Suda et al. are directed to small articles with diameters such as 150mm (which corresponds to an external perimeter of about 18 inches) as admitted in the Final Rejection at paragraph 6, page 5. In contrast, the CVD SiC articles of the presently claimed invention have an external perimeter in excess of 50 inches and an aspect ratio of 50 or greater. Suda et al. disclose a SiC article which is much smaller than the CVD-SiC of the presently claimed invention. A person of skill in the art would not have had any reason or motivation to make the presently claimed article based on the disclosure of Suda et al. in view of the unpredictability of scaling SiC materials as discussed above.

To overcome the deficiencies of Suda et al. to make a larger SiC article, Applicants have surprisingly discovered that by depositing chemical vapor deposited silicon carbide on a solid substrate such as a mandrel, while it is being rotated and with an isolation device positioned adjacent to the solid substrate with a boundary zone separating the solid substrate and the isolation device, a shallow chemical vapor deposited monolithic silicon carbide shell having an

external perimeter in excess of 50 inches and an aspect ratio of 50 or greater may be made as recited in present claim 27. Such an arrangement prevents chemical vapor deposited silicon carbide from forming a substantial silicon carbide bridge joining the silicon carbide on the solid substrate to adjacent structures in the deposition chamber. This allows removal of the silicon carbide deposit from the deposition chamber such that undesired crack formation in the deposit having the claimed size dimensions is prevented or substantially reduced. (See page 4, lines 20-33, and page 6, line 30 to page 9, line 6.) Accordingly, larger silicon carbide articles may be made and the problems described in the articles with respect to Weibull distribution are mitigated or eliminated.

Suda et al. do not make their silicon carbide articles by rotating the deposition substrates and using an isolation device to prevent silicon carbide bridging between the deposition substrates and other parts of the deposition chamber. Suda et al. disclose a method using a carbon substrate to deposit silicon carbide and a cooling rate of 200° C/hour or less to form silicon carbide articles having a maximum diameter of 150mm (perimeter of about 18.5 inches). See column 2, lines 13-23, and line 27 to column 3, line 30, and column 4, lines 15-47. Suda et al. do not address the problems of making hollow chemical vapor deposited monolithic silicon carbide articles within the size ranges of the present claims. Accordingly, a person of skill in the art would not have been motivated to make a hollow chemical vapor deposited monolithic silicon carbide shell having an external perimeter in excess of 50 inches and an aspect ratio of 50 or greater in view of Suda et al.

Applicants respectfully request withdrawal of the rejection of claims 27-29 and 32-34 under 35 U.S.C. §103(a) in view of U.S. 5,783,255 to Suda et al.

Claim 30 is rejected under 35 U.S.C. 103(a) as allegedly unpatentable over U.S. 5,783,255 to Suda et al. in view of U.S. 5,776,391 to Sibley. Applicants respectfully traverse this rejection.

Claim 30 depends directly from claim 27. As discussed above, Suda et al. do not teach or suggest the subject matter of claim 27.

Sibley does not make up for the deficiencies of Suda et al. They do not teach or suggest a hollow chemical vapor deposited monolithic silicon carbide shell having an external perimeter in

excess of 50 inches and an aspect ratio of 50 or greater wherein the density of said chemical vapor deposited monolithic silicon carbide is at least 3.15 grams per cubic centimeter.

Applicants respectfully request withdrawal of the rejection of claim 30 under 35 U.S.C. §103(a) over U.S. 5,783,255 to Suda et al. in view of U.S. 5,776,391 to Sibley.

Favorable consideration and allowance of claims 27-30 and 32-35 are earnestly solicited.

If the Examiner has any questions concerning this response or the application, or if he believes the application is for any reason not yet in condition for allowance, he is respectfully requested to telephone the undersigned at the number set forth below in order to expedite allowance of the application.

Respectfully submitted,

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